

ROSS ENVIRONMENTAL ASSOCIATES, INC.

Hydrogeology, Water Quality,  
Contaminant Fate & Transport, Remediation,  
& Regulatory Compliance and Permitting

SEP 20 2002



19 September 2002

Mr. Chuck Schwer  
Department of Environmental Conservation  
Waste Management Division  
103 South Main Street, West Building  
Waterbury, Vermont 05671-0404

RE: *Initial Site Investigation Report*  
*Frank Adams School - St. Johnsbury, Vermont*

Dear Chuck:

Enclosed is one bound copy of the final report for the Initial Site Investigation completed at the Frank Adams School located in St. Johnsbury, Vermont.

Please feel free to call me, if you have any questions regarding the enclosed information or recommendations.

Sincerely,

Robert J. Ross, CGWP  
Principal Hydrogeologist

enclosure

cc. Mr. David Baker  
Mr. Edward Zuccaro - Zuccaro, Willis & Bent

Rjr/ref: 22040CI01b

SEP 20 2002



## **Initial Site Investigation Report**

**Frank R. Adams School  
Summer Street  
St. Johnsbury, Vermont**

**SMS Site #: WMD 1195**

**22 August 2002**

**Prepared For:  
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**R.E.A. Project No. 22-040  
R.E.A. Document #: 22040ISI**

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**Appendix A Figures and Tables**

**Appendix B Site Photographs**

**Appendix C Soil Boring/Monitoring Well Logs**

**Appendix D Laboratory Reports**

Ross Environmental Associates, Inc. (*R.E.A.*) has conducted an initial site investigation (ISI) at the Frank R. Adams School owned by the St. Johnsbury School District, located at 481 Summer Street in St. Johnsbury, Vermont. Field investigation included: installation of four soil borings/monitoring wells; field screening of subsurface soil samples for the possible presence of volatile organic compounds (VOCs); sampling and analysis of water from the four monitoring wells; and a receptor survey to identify potential risks to the environment and human health.

Available information indicates that groundwater beneath the School property has been impacted by fuel oil related compounds. The contamination present at the site is most likely from the former 6,500 gallon heating oil underground storage tank (UST) that was removed from the property in June 2002. At this time, subsurface petroleum contamination is located in the immediate vicinity of the former UST; however, the downgradient extent of dissolved phase contamination has not been defined.

On the basis of the results of this investigation and the conclusions stated above, *R.E.A.* makes the following recommendations.

1. Additional soil borings/monitoring wells should be installed in the downgradient of the former UST to define the downgradient extent of contamination and to ensure that adjacent properties are not impacted by contaminant migration;
2. Following the completion of the supplemental subsurface investigation, ground water samples should be collected and analyzed for the possible presence of volatile organic compounds (VOCs) and total petroleum hydrocarbons (TPH) by U.S. EPA Methods 8021B and 8015DRO, respectively; and
3. A summary report should be completed following the completion of the additional work at the site, which will include recommendations for site remediation and/or long-term monitoring as appropriate.

### **Site Information**

Site Name: Frank R. Adams School  
SMS Site #: WMD 1195  
Site Address: 481 Summer Street, St. Johnsbury, VT  
Mailing Address: 257 Weston Ave, St. Johnsbury, VT  
Telephone: (802) 748-8616  
Contact/Owner: David Baker  
Coordinates: latitude 44° 25' 20.5" N, and longitude 72° 01' 16.5" W  
Contaminants of Concern: Fuel Oil  
  
Source: Suspected release from former UST system. UST system was removed on 20 June 2002.

### **Aquifer Characteristics**

Soil Type: The soils at the site consisted primarily of medium sand.  
Effective Porosity: 0.3  
Hydraulic conductivity: 0.25 to 14 ft/day  
Ground-water flow direction: North (7/10/02)  
Horizontal hydraulic gradient: 5.0 (7/10/02)  
Average ground water velocity: 4.1 to 233 ft/day  
Ground-water depth bgs: 5.49 to 6.70 feet (7/10/02)  
Saturated thickness: >7 feet  
Depth to Bedrock: > 13 feet

### **Receptors**

Drinking water: The site and adjacent properties are served by municipal sewer and water systems.  
Ground water: Impacted by petroleum contamination; see Table 2, Appendix A.  
Surface water: There are no surface water bodies within a close proximity to the site.  
Buildings: The School is a one-story building constructed on an at-grade-slab foundation.  
Underground utilities: Water, sewer and storm drains are located along Winter Street, which is located upgradient of the former UST.  
Air Quality: Possible fugitive emissions to the atmosphere may occur due to subsurface contamination. The possibility of ambient air contamination is very low, but the risk would increase if subsurface soils were exposed.

## 1.0 INTRODUCTION

**R.E.A.** was retained by Mr. David Baker to complete an initial site investigation (ISI) at the Frank R. Adams School located on Summer Street in St. Johnsbury, Vermont in accordance with Vermont Department of Environmental Conservation (VT DEC) guidelines. The site investigation was initiated following the discovery of subsurface petroleum contamination during the removal of a 6,500-gallon fuel oil UST on 20 June 2002. This report has been prepared by **R.E.A.** under the direction of Mr. David Baker; unauthorized use or reproduction of this report is prohibited, without written authorization from **R.E.A.**, or Mr. David Baker.

### 1.1 Site Location and Setting

The subject property, which is currently owned by the St. Johnsbury School District, is a former elementary school located in a residential area of St. Johnsbury, Vermont. The property is occupied by a single story brick building. The property is located on the corner of Summer and Winter Streets (Figure 1, Appendix A). The Site and surrounding properties are serviced by municipal sewer and water systems.

The ground surface has an average elevation of approximately 650 feet above mean sea level (Maptech, 1997). The geographic coordinates of the site are: latitude 44° 25' 20.5" N, and longitude 72° 01' 16.5" W.

The surficial geology in the vicinity of the site is mapped as littoral sediment, predominantly sand, well-sorted sand with no pebbles or boulders (Stewart and MacClintock, 1970). Bedrock in the St. Johnsbury area is mapped as the Waits River formation (Doll, 1961).

Figure 2 in Appendix A, shows the approximate locations of various site features. Photographs of the site and surrounding area taken in August 2002 are included in Appendix B.

### 1.2 Site History

Prior to 1957, the property was used as a playground associated with the adjacent Summer Street School. In 1957, the school was constructed on the property. The former UST was installed in 1957 during the construction of the school.

On 20 June 2002 **R.E.A.** provided oversight of the removal of the fuel oil UST. The UST was found to be in poor condition, with some rust and pitting observed along the bottom center seam of the UST. Strong petroleum odors were noted directly beneath the tank, with petroleum contamination

extending into the underlying groundwater formation, which was encountered approximately ten feet bgs. Approximately 1/8-inch of free product was observed in the bottom of the UST excavation. PID readings on the soils in the excavation ranged from 12.2 to 347 parts per million volume (ppmv). Approximately 38 cubic yards of petroleum-contaminated soil was transported off site to ESMI for thermal destruction.

### **1.3 Land Use and Adjacent Property Ownership**

The Frank Adams School is located in a residential area within the City limits of St. Johnsbury. The property is located on the corner of Summer and Winter Streets, which form the western and northern property boundaries, respectively. Private residences bound the eastern and southern boundaries of the school property.

## **2.0 FIELD INVESTIGATION RESULTS AND PROCEDURES**

*R.E.A.*'s field investigation included: the installation of four soil borings/monitoring wells (MW-1, MW-2, MW-3, and MW-4); field screening of subsurface soil samples for the possible presence of VOCs; collection and analysis of water samples from four on-site monitoring wells; and a receptor survey to identify potential risks to the environment and human health. Approximate monitoring well locations and significant site features are shown on Figure 2 in Appendix A.

The objectives of this initial site investigation were to:

- Evaluate the degree and extent of petroleum contamination in soil and ground water;
- Qualitatively assess the risks to the environment and public health via relevant sensitive receptors and potential contaminant migration pathways; and
- Identify the need for further site characterization, appropriate monitoring, and/or remedial actions based on the site conditions.

### **2.1 Contaminants of Concern**

Based on available information, the contaminants of concern (COC) at the site appear to include: benzene, toluene, ethylbenzene, xylene, 1,3,5-trimethyl benzene, 1,2,4-trimethyl benzene, and naphthalene. All of these contaminants are typically associated with fuel oil related petroleum products.

## 2.2 Source Area Evaluation

Current information suggests that the former heating oil UST system is the likely source of petroleum contamination discovered at the Site. During removal of the former UST, the tank was noted to be in poor condition, with some rusting and pitting. Free-product was observed in the bottom of the excavation after the removal of the UST.

## 2.3 Soil Boring and Monitoring Well Installation

On 3 July 2002, *R.E.A.* provided oversight during the installation of four soil borings/monitoring wells; MW-1 was installed in the vicinity of the former UST, MW-2 was installed in the apparent downgradient direction of the former UST, MW-3 and MW-4 were installed in crossgradient locations from the former UST. The soils at the site consisted primarily of well-sorted medium sand. The borings extended at least five feet below the water table, which was encountered between six and eight feet below ground surface (bgs) at the time of drilling. Soil borings for MW-1, MW-3 and MW-4 were all extended to approximately fifteen feet bgs. The soil boring for MW-2 was extended to approximately thirteen feet bgs.

Monitoring wells were constructed using 2-inch-diameter schedule 40 polyvinyl chloride (PVC), with flush-threaded joints. Seven foot sections of factory-slotted well screens (0.01-inch) were installed at the bottom of the borings; solid PVC risers extending to ground surface were used to complete each well. A clean sand pack was placed around the screened section of each monitoring well extending one to two feet above the top of the screen, with a bentonite seal placed above the sand pack. Flush-mounted road-box protective casings were installed over each monitoring well. Each well was developed after installation by hand bailing and removing eight to ten standing volumes of water. Soil descriptions and monitoring well construction details are included on the soil boring logs in Appendix B. Technical Drilling Services (TDS) of Sterling, Massachusetts installed the soil borings and monitoring wells using hollow stem auger drilling methods under direct supervision of *R.E.A.*

After installation of the monitoring wells, *R.E.A.* surveyed the locations of the new monitoring wells in relation to existing site features and roadways. Each well was located in azimuth to an accuracy of  $\pm 1.0$  feet, and in elevation with an accuracy of  $\pm 0.01$  feet relative to an on-site benchmark of 100.00 feet for the top of casing at MW-2.

PID readings on soil samples collected during soil borings/monitoring wells installation from MW-1, MW-2 and MW-3 ranged from 0.0 to 312 ppmv. PID readings from MW-4 were 0.0 ppmv. PID

screening results are included on the soil boring logs in Appendix B. R.E.A.'s hydrogeologist screened soil samples from each soil boring for the possible presence of volatile organic compounds (VOCs) using a PE PhotoVac model 2020 portable PID. The PID was calibrated with an isobutylene standard gas to a benzene reference.

#### **2.4 Ground Water Elevations and Flow Direction**

On 10 July 2002, ground-water flow in the unconfined surficial aquifer at the site was generally toward the north, with an estimated hydraulic gradient of approximately five (5.0) percent (MW-3 to MW-2). Water-level measurements and elevation calculations for 10 July 2002 are presented in Table 1 and the ground-water contour map prepared using this data is presented as Figure 3, Appendix A.

No indications of free-phase petroleum were observed in any of the monitoring wells; however, petroleum odors and sheening were noted in monitoring wells MW-1 and MW-2 during purging and sample collection. Static water-table elevations were computed for each monitoring well by subtracting the corrected or measured depth-to-water readings from the surveyed top-of-casing (TOC) elevations, which are relative to an arbitrary site datum of 100.00 feet (MW-2).

The effective porosity of the medium sand encountered below the water-table is presumably around 0.3, with hydraulic conductivities ranging between 0.25 and 14 feet per day (Freeze & Cherry, 1979). Assuming Darcian flow, these estimates combine with the calculated horizontal gradient of five percent to yield an estimated range of ground-water flow velocities of between 4.1 and 233 feet per day. Contaminant migration would be less accounting for retardation and dispersion of the contaminants.

#### **2.5 Ground-Water Sampling and Analysis**

Available information indicates that the subsurface petroleum contamination discovered at the site, is characteristic of fuel oil. Contaminant distribution indicates the likely source of petroleum contamination on the school property is the former fuel oil UST, which was removed in June 2002. The downgradient extent of subsurface petroleum contamination has not been determined.

The Vermont Groundwater Enforcement Standards (VGESs) <sup>1</sup> for 1,3,5-trimethylbenzene, 1,2,4-trimethylbenzene, and naphthalene were exceeded in the ground water samples collected from monitoring wells MW-1, and MW-2. The highest total volatile petroleum compound concentration was detected in the sample collected from MW-2 (located downgradient of the former UST). Low concentrations of toluene and total xylenes were also detected in the sample collected from MW-1, and total xylenes were also detected in the MW-2 sample. No volatile petroleum compounds were detected in the samples collected from MW-3 or MW-4.

Total petroleum hydrocarbons (TPH) were detected in the samples collected from MW-1, MW-2, and MW-3 at concentrations between 0.66 and 9.09 milligrams per liter (mg/L). TPH was not detected above the detection limit of mg/L (MW-4) in samples collected on 10 July 2002.

No petroleum compounds were detected in the trip-blank sample. Analytical results for the blind field duplicate, collected from MW-2 (labeled MW-22), ranged from 0.0 percent to 7.2 percent for individual compounds; which is well below the EPA recommended percent difference of 30 percent. Greater than ten unidentified peaks (UIP's) were detected in samples collected from all four monitoring wells. The UIP's indicate that compounds other than those targeted for the 8021b analysis may be present in the groundwater at the Site.

Groundwater analytical results are summarized on Table 2, and copies of the laboratory analytical reports are included as Appendix C. Contaminant distribution based on water samples collected on 10 July 2002 is shown on Figure 4 in Appendix A. All of the samples were analyzed for the possible presence of volatile petroleum compounds and total petroleum hydrocarbons (TPH) in accordance with U.S. EPA Methods 8021B and 8015 for diesel range organics (DRO), respectively. All samples were transported under chain-of-custody in an ice-filled cooler to Endyne, Inc. of Williston, Vermont for laboratory analysis.

Immediately after sample collection, field measurements were obtained for pH, specific conductivity, temperature, total dissolved solids (TDS), and oxygen reduction potential (ORP). Review of field indicator parameters indicate that the ORP concentration was a little low indicating that anaerobic degradation of the contaminants may be occurring. A summary of the field measurement data is included on Table 3, in Appendix A.

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<sup>1</sup>The Vermont DEC has established groundwater enforcement standards for eight petroleum related VOCs, as follows: benzene - 5 ug/L; toluene - 1,000 ug/L; ethylbenzene - 700 ug/L; xylenes - 10,000 ug/L; MTBE - 40 ug/L; 1,3,5-trimethyl benzene - 4 ug/L; 1,2,4-trimethyl benzene - 5 ug/L; and naphthalene - 20 ug/L.

## 2.6 Investigation Procedures

The procedures used during the initial site investigation the former Burkewitz Oil Company are consistent with the following guidance documents:

- "Site Investigation Guidance." Vermont Agency of Natural Resources, Waste Management Division. August 1996.
- "Corrective Action Guidance." Vermont Agency of Natural Resources, Waste Management Division. November 1997.
- "Agency Guidelines for Petroleum Contaminated Soil and Debris." Vermont Agency of Natural Resources, Waste Management Division. August 1996.
- ASTM D 2488-93. "Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)." American Society for Testing and Materials.
- ASTM D 5092-90. "Standard Practice for Design and Installation of Ground Water Monitoring Wells in Aquifers." American Society for Testing and Materials.
- ASTM D 4750-87. "Standard Test Method for Determining Subsurface Liquid Levels in a Borehole or Monitoring Well." American Society for Testing and Materials.
- ASTM D 4448-85a. "Standard Guide for Sampling Ground Water Monitoring Wells." American Society for Testing and Materials.

## 3.0 SENSITIVE RECEPTOR IDENTIFICATION AND RISK ASSESSMENT

No sensitive receptors were identified immediately adjacent to the school property during the ISI; however, ambient air could be impacted if the subsurface soils in the area of the former UST were to be disturbed.

### 3.1 Receptor Identification

- No receptors were identified.

### 3.2 Risk Assessment

On the basis of the information obtained during this investigation, **R.E.A.** has qualitatively assessed the risks that the subsurface contamination poses to human health and the environment. The findings are summarized as follows:

- Exposure to contaminated media is possible during subsurface invasive activities. Personnel involved in these activities should be properly trained.
- The school building is constructed on an at-grade-slab foundation.
- No surface water bodies are located within close proximity of the site.

#### 4.0 DATA EVALUATION AND REGULATORY STATUS

Available information indicates that groundwater beneath the site has been impacted by petroleum related compounds, which are characteristic of fuel oil. Contaminant distribution indicates the likely source of contamination at the site is the former heating oil UST. At this time, the downgradient extent of subsurface petroleum contamination has not been determined.

Generally, the VT DEC requires active remediation when greater than an 1/8" of free-product is present, or when human health or a sensitive receptor is impacted or threatened by contamination. Based on available information, active remediation at the site is not likely to be required. The VT DEC may require periodic monitoring of ground water beneath the site; however the frequency of future sampling events should be determined after confirmation of the initial results.

A summary of the significant findings of the ISI is outlined below:

- The Vermont Ground Water Enforcement Standards (VGESs) for 1,3,5-trimethylbenzene, 1,2,4-trimethylbenzene, and naphthalene were exceeded in the ground water samples collected from MW-1 and MW-2.
- No VOCs were detected in the samples collected from MW-3 and MW-4;
- Total petroleum hydrocarbons (TPH) were detected in the samples collected from MW-1, MW-2, and MW-3 at concentrations between 0.66 and 9.09 milligrams per liter (mg/L).
- PID readings on subsurface soil samples collected during soil boring for MW-1 and MW-2, located directly adjacent to the former UST, ranged between 0.3 and 312 ppmv.
- PID readings on subsurface soil samples collected from the soil boring for MW-3, located cross-gradient from the former UST, ranged from 3.9 to 43.8 ppmv, and PID readings on subsurface soil samples collected from the MW-4 soil boring, located upgradient of the former UST were all 0.0 ppmv.
- Ground water flow in the shallow overburden formation appears to flow to the north.
- No sensitive receptors were identified immediately adjacent to the school property during the ISI; however, ambient air could be impacted if the subsurface soils in the area of the former UST were to be disturbed.

## 5.0 RECOMMENDATIONS

On the basis of the results of this investigation and the conclusions stated above, **R.E.A.** makes the following recommendations.

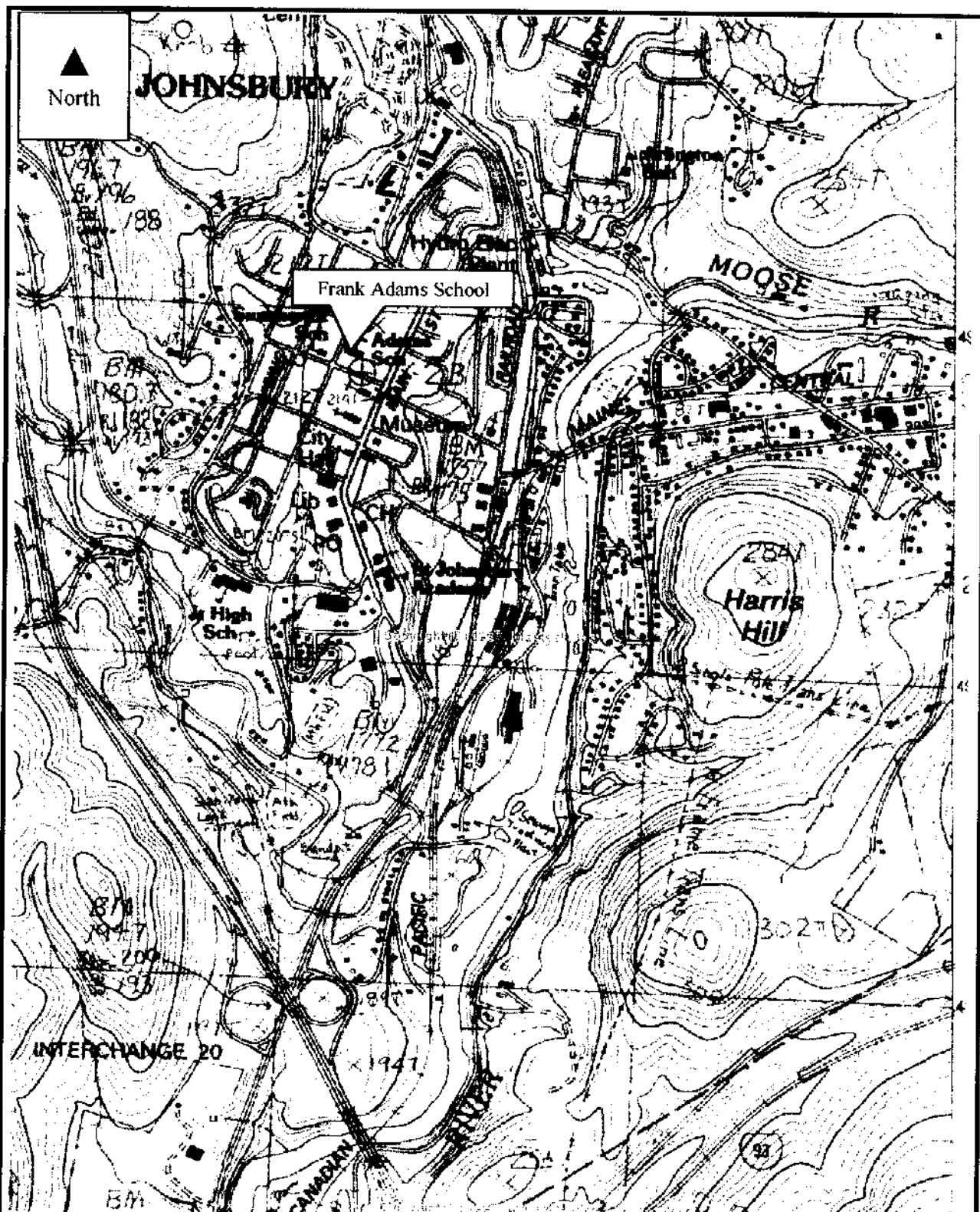
1. Additional soil borings/monitoring wells should be installed in the downgradient of the former UST to define the downgradient extent of contamination and to ensure that adjacent properties are not impacted by contaminant migration;
2. Following the completion of the supplemental subsurface investigation, ground water samples should be collected and analyzed for the possible presence of VOCs and TPH by U.S. EPA Methods 8021B and 8015DRO, respectively; and
3. A summary report should be completed following the completion of the additional work at the Site, which will include recommendations for site remediation and/or long-term monitoring as appropriate.

## 6.0 REFERENCES

- Doll, C.G. and others, 1961. "*Geologic Map of Vermont*", Office of the State Geologist.
- Freeze, R. A., and Cherry, J.A., 1976. *Groundwater*, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 29 p.
- Fetter, C.W., 1994. *Applied Hydrogeology, 3rd Ed.*, Prentice Hall, Englewood Cliffs, New Jersey, 691 p.
- Stewart, D.P. and MacClintock, P., 1970. "*Surficial Geologic Map of Vermont*", Office of the State Geologist.
- Maptech, 1997. Orleans Quadrangle, Vermont. U.S. Geological Survey. 7.5 minute series (topographic). Provisional Edition, 1986. Maptech, Inc. Greenland, NH. 1997.

**A  
P  
P  
E  
N  
D  
I  
X  
  
A**

**FIGURES AND TABLES**



Approximate Scale: 1 inch = 1,400 feet

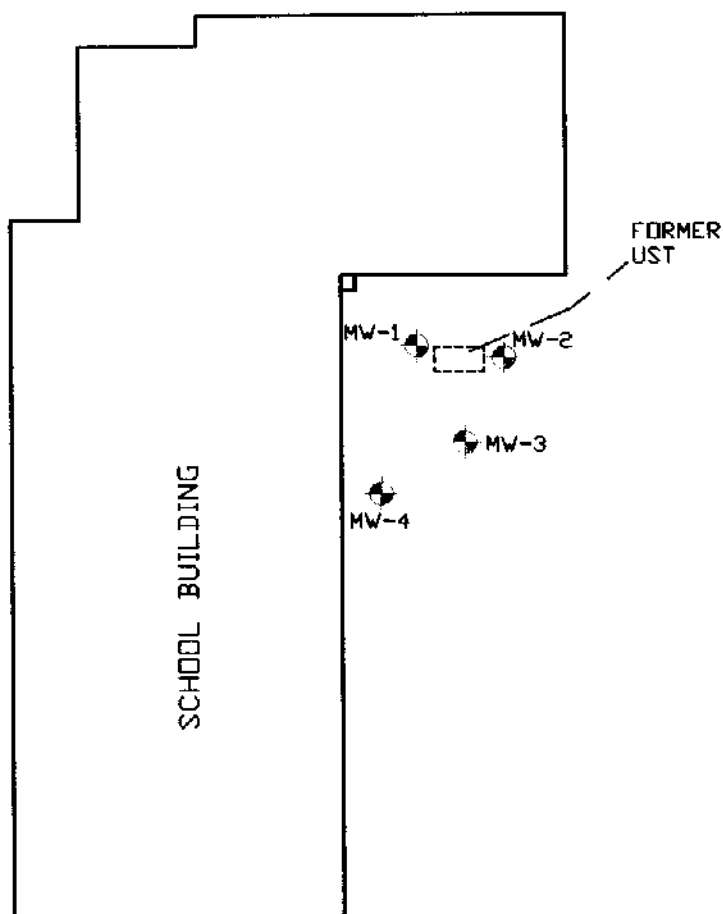
Site Coordinates: 44° 25' 20.47" N, 72° 01' 16.51" W

Source: USGS 1983. St. Johnsbury, VT.  
 Provisional Edition 1983. Topographic map  
 (7.5 X 15 minute series) Maptech, Inc. 1998.  
 R.E.A. Project No. 22-044

**Figure 1**  
 Site Location Map  
 Frank Adams School  
 St. Johnsbury, Vermont


SUMMER STREET

North



**Legend**

 Monitoring Well Location

 Water/Sewer Line  
All locations are approximate

**SITE PLAN**

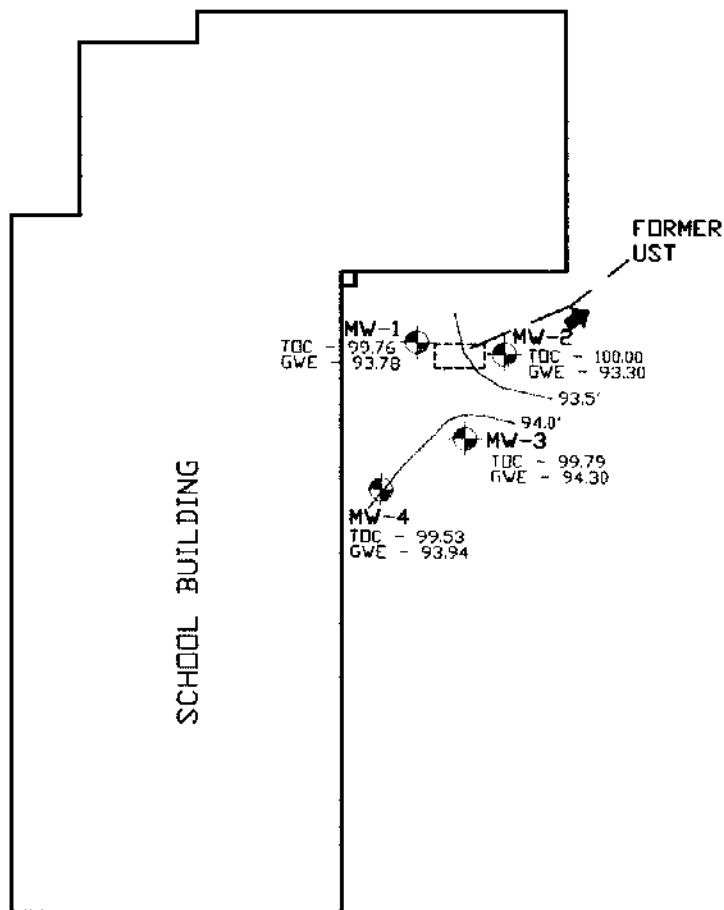
(with monitoring well locations)  
Frank Adams School  
St. Johnsbury, Vermont

Scale	Date	Drawn By
1"=40'-0"	JULY 9 2002	TFMD
File Name	Approved By	
22-040		

*Ross Environmental Associates, Inc.*  
Stowe, Vermont (802) 253-4280

**FIGURE 2**

SUMMER STREET



TDC - Top of Casing Elevation  
 GWE - Ground Water Elevation  
 Elevations relative to an arbitrary site datum of 100.00 feet.

**Legend**

- Monitoring Well Location
- Ground Water Contour
- Water/Sewer Line
- All locations are approximate

**GROUND WATER CONTOUR MAP**

(Monitoring Date: 10 July 2002)

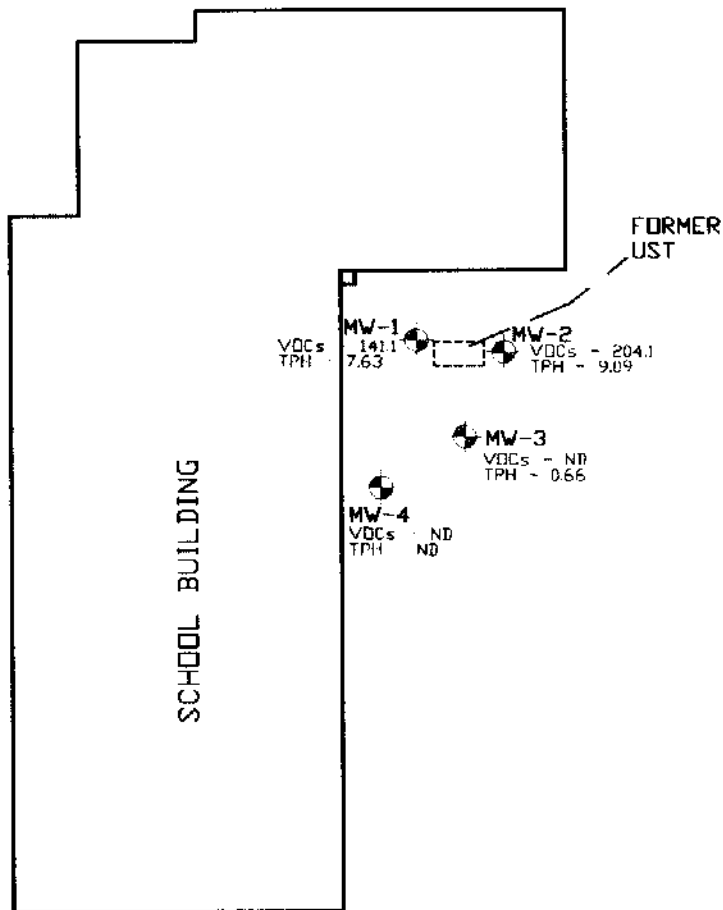
Frank Adams School  
 St. Johnsbury, Vermont

Scale 1"=40'-0"	Date JULY 3 2002	Drawn By TFMD
File Name 22-040	Approved By	

**Ross Environmental Associates, Inc.**  
 Stowe, Vermont (802) 253-4280

**FIGURE 3**

SUMMER STREET



VOCs - Total volatile organic compounds, reported in ug/l.  
TPH - Total petroleum hydrocarbons, reported in mg/l.  
ND - Not detected during lab analysis.

**Legend**

Monitoring Well Location

Water/Sewer Line  
All locations are approximate

**CONTAMINANT DISTRIBUTION MAP**

(Monitoring Date: 10 July 2002)

**Frank Adams School  
St. Johnsbury, Vermont**

Scale 1"=40'-0"	Date JULY 3 2002	Drawn By TPMD
File Name 22-040	Approved By	

**Ross Environmental Associates, Inc.**  
Stowe, Vermont (802) 253-4280

**FIGURE 4**

**TABLE 1**  
**GROUND WATER ELEVATION CALCULATIONS**

Frank Adams School  
St. Johnsbury, Vermont

Monitoring Date: 10 July 2002

Well I.D.	Top of Casing Elevation (ft)	Depth to Water (feet, TOC)	Depth to Bottom (BTOC)	Water Table Elevation (ft)
MW-1	99.76	5.98	13.01	93.78
MW-2	100.00	6.70	12.05	93.30
MW-3	99.79	5.49	13.16	94.30
MW-4	99.53	5.59	12.50	93.94

All values reported in feet relative to arbitrary site datum of 100.00 feet

**TABLE 2**  
**GROUND-WATER ANALYTICAL RESULTS**

Frank Adams School  
Summer Street  
St. Johnsbury, Vermont

Monitoring Date: 10 July 2002

Sample ID	MTBE	Benzene	Toluene	Ethyl benzene	Total Xylenes	1,3,5 TMB	1,2,4 TMB	Napthalene	Total VOCs	UIP	TPH
MW-1	ND<10.0	ND<5.0	10.9	ND<5.0	46.7	17.4	30.6	35.5	141.1	>10	7.63
MW-2	ND<10.0	ND<5.0	ND<5.0	ND<5.0	14.7	16.6	48.8	124	204.1	>10	9.09
MW-3	ND<2.0	ND<1.0	ND<1.0	ND<1.0	ND<2.0	ND<1.0	ND<1.0	ND<1.0	ND	>10	0.66
MW-4	ND<2.0	ND<1.0	ND<1.0	ND<1.0	ND<2.0	ND<1.0	ND<1.0	ND<1.0	ND	0	ND<0.40
<b>VGES</b>	<b>40</b>	<b>5.0</b>	<b>1,000</b>	<b>700</b>	<b>10,000</b>	<b>4.0</b>	<b>5.0</b>	<b>20</b>	--	--	--

Sample ID	MTBE	Benzene	Toluene	Ethyl benzene	Total Xylenes	1,3,5 TMB	1,2,4 TMB	Napthalene	Total VOCs	UIP	TPH
MW-2	ND<10.0	ND<5.0	ND<5.0	ND<5.0	14.7	16.6	48.8	124	204.1	>10	9.09
duplicate MW-2 (labeled MW-22)	ND<10.0	ND<5.0	ND<5.0	ND<5.0	15.3	17.8	52.3	124	209.4	>10	8.54
% Difference	0.0	0.0	0.0	0.0	4.1	7.2	7.2	0.0	2.6	--	6.1
Trip Blank	ND<2.0	ND<1.0	ND<1.0	ND<1.0	ND<2.0	ND<1.0	ND<1.0	ND<1.0	ND	0	NS

UIP: Unidentified Peaks.

Shaded values indicate exceedance of Vermont Groundwater Enforcement Standards (VGESs).

1,3,5-TMB: 1,3,5-trimethylbenzene

1,2,4-TMB: 1,2,4-trimethylbenzene

ND - None Detected

NS - Not Sampled

**TABLE 3**  
**FIELD MEASUREMENT DATA**

Frank Adams School  
St. Johnsbury, Vermont

Monitoring Date: 10 July 2002

Well ID	pH (su)	temperature (°C)	Specific conductivity (uS)	ORP (mV)	TDS (ppm)
MW-1	5.90	15.1	830.5	0	558.3
MW-2	6.06	15.3	992.9	0	673.2
MW-3	6.69	15.2	899.9	0	608.2
MW-4	6.80	15.1	744.2	0	499.3

pH reported in standard units (s.u.).

Specific conductivity reported in microsiemens (uS) or millisiemens (mS).

Oxidation-reduction potential (ORP) reported in millivolts (mV).

Total dissolved solids (TDS) reported in parts per million (ppm) or parts per (ppt) thousand.

**SITE PHOTOGRAPHS**

**A  
P  
P  
E  
N  
D  
I  
X  
  
B**

**SOIL BORING  
MONITORING WELL LOGS**

**A  
P  
P  
E  
N  
D  
I  
X  
  
C**



# BORING / WELL IDENTIFICATION: MW-1

SITE NAME: Frank Adams School

SITE LOCATION: St. Johnsbury, Vermont

INSTALLATION DATE: 2 July 2002

JOB NUMBER: 22-040

WELL DEPTH:	15' bgs	BORING DEPTH:	15' bgs	REA REPRESENTATIVE:	Patricia Coppolino
DEPTH TO WATER (DURING DRILLING):	8' bgs	15' bgs to 5' bgs		DRILLING COMPANY:	Technical Drilling Company Sterling, Massachusetts
SCREEN DIAMETER:	2"				
SCREEN TYPE/SIZE:	0.010 slot schedule 40 PVC			SAMPLING METHOD:	Hollow Stem Auger
RISER DIAMETER:	2"	DEPTH:	5' bgs to 0.6' bgs	REFERENCE POINT (RP):	not measured
RISER TYPE/SIZE:	Schedule 40 PVC				

DEPTH (IN FEET)	SAMPLE DEPTH (FT)	BLOWS/6" AND RECOVERY (inches)	SAMPLE DESCRIPTION AND NOTES	PID (PPM)	WELL PROFILE	LEGEND
0	0-2	3/3/3/4 11"	Top 11": brown medium SAND	0.0		Concrete
1			Same as Above	5.9		Native Material
2	2-4	5/3/3/4 14"				Bentonite
3			Top 15": light brown medium SAND	34.3		Filter Sand
4	4-6	3/3/4/5 15"				Riser
5			Top 22": Same as Above Bottom: light brown SAND and SILT	312		Screen
6	6-8	3/3/5/4 24"				Water Level
7			Top 16": light brown fine SAND. Wet	0.3		
8	8-10	2/2/2/2 16"				
9			Same as above grades to a very fine SAND	0.0		
10	10-12	2/2/2/2 16"				
11			Bottom of Boring. Set well at 15'			
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

PROPORTIONS USED  
AND 33-50%  
SOME 20-33%  
LITTLE 10-20%  
TRACE 0-10%

BLOW COUNT (COHESIVE SOILS)  
<2 VERY SOFT  
2-4 SOFT  
4-8 MEDIUM STIFF  
8-15 STIFF  
15-30 VERY STIFF  
>30 HARD

BLOW COUNT (GRANULAR SOILS)  
0-4 VERY LOOSE  
4-10 LOOSE  
10-30 MEDIUM DENSE  
30-50 DENSE  
>50 VERY DENSE

Notes:  
PID used: Photovac 2020



# BORING / WELL IDENTIFICATION: MW-2

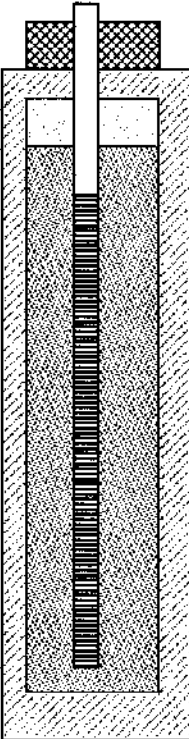







SITE NAME: **Frankl Adams School**

SITE LOCATION: **St. Johnsbury, Vermont**

INSTALLATION DATE: **2 July 2002**

JOB NUMBER: **22-040**

WELL DEPTH:	<b>13' bgs</b>	BORING DEPTH:	<b>13' bgs</b>	REA REPRESENTATIVE:	<b>Patricia Coppolino</b>
DEPTH TO WATER (DURING DRILLING):	<b>7' bgs</b>	DRILLING COMPANY:	<b>Technical Drilling Company Sterling, Massachusetts</b>		
SCREEN DIAMETER:	<b>2"</b>	DEPTH:	<b>13' bgs to 3' bgs</b>	SAMPLING METHOD:	<b>Hollow Stem Auger</b>
SCREEN TYPE/SIZE:	<b>0.010 slot schedule 40 PVC</b>	REFERENCE POINT (RP):	<b>not measured</b>		
RISER DIAMETER:	<b>2"</b>	DEPTH:	<b>3' bgs to 0.6' bgs</b>		
RISER TYPE/SIZE:	<b>Schedule 40 PVC</b>				

DEPTH (IN FEET)	SAMPLE DEPTH (FT)	BLOWS/6" AND RECOVERY (inches)	SAMPLE DESCRIPTION AND NOTES		PID (PPM)	WELL PROFILE	LEGEND
0							 Concrete
1							 Native Material
2							 Bentonite
3							 Filter Sand
4	4-6	3/3/2/3 7"	Top 7": brown med SAND. Moist at bottom		50.3		 Riser
5							 Screen
6							 Water Level
7							
8							
9	9-11	1/1/1/2 24"	Top 24": grey fine SAND		151.0		
10							
11							
12							
13							
14			Set well at 13'				
15							
16							
17							
18							
19							
20							
21							
22							
PROPORTIONS USED AND 33-50% SOME 20-33% LITTLE 10-20% TRACE 0-10%		BLOW COUNT (COHESIVE SOILS) <2 VERY SOFT 2-4 SOFT 4-8 MEDIUM STIFF 8-15 STIFF 15-30 VERY STIFF >30 HARD		BLOW COUNT (GRANULAR SOILS) 0-4 VERY LOOSE 4-10 LOOSE 10-30 MEDIUM DENSE 30-50 DENSE >50 VERY DENSE		Notes: PID used: Photovac 2020	



# BORING / WELL IDENTIFICATION: MW-3

SITE NAME: Frank Adams School

SITE LOCATION: St. Johnsbury, Vermont

INSTALLATION DATE: 2 July 2002

JOB NUMBER: 22-040

WELL DEPTH:	15' bgs	BORING DEPTH:	15' bgs	REA REPRESENTATIVE:	Patricia Coppolino
DEPTH TO WATER (DURING DRILLING):	8' bgs	DRILLING COMPANY:	Technical Drilling Company Sterling, Massachusetts		
SCREEN DIAMETER:	2"	DEPTH:	15' bgs to 5' bgs	SAMPLING METHOD:	Hollow Stem Auger
SCREEN TYPE/SIZE:	0.010 slot schedule 40 PVC	REFERENCE POINT (RP):	not measured		
RISER DIAMETER:	2"	DEPTH:	5' bgs to 0.6' bgs		
RISER TYPE/SIZE:	Schedule 40 PVC				

DEPTH (IN FEET)	SAMPLE DEPTH (FT)	BLOWS/6" AND RECOVERY (inches)	SAMPLE DESCRIPTION AND NOTES	PID (PPM)	WELL PROFILE	LEGEND
0						
1						
2						
3						
4	4-6	3/3/1/3 9"	Top 9": brown medium SAND.	43.8		
5						
6						
7						
8						
9	9-11	2/1/1/1 24"	Top 24": Brown fine SAND. WET. Sheening on water.	3.9		
10						
11						
12						
13						
14						
15						
16			Bottom of Boring. Set well at 15'			
17						
18						
19						
20						
21						
22						

PROPORTIONS USED  
AND 33-50%  
SOME 20-33%  
LITTLE 10-20%  
TRACE 0-10%

BLOW COUNT (COHESIVE SOILS)  
<2 VERY SOFT  
2-4 SOFT  
4-8 MEDIUM STIFF  
8-15 STIFF  
15-30 VERY STIFF  
>30 HARD

BLOW COUNT (GRANULAR SOILS)  
0-4 VERY LOOSE  
4-10 LOOSE  
10-30 MEDIUM DENSE  
30-50 DENSE  
>50 VERY DENSE

Notes:  
PID used: Photovac 2020



# BORING / WELL IDENTIFICATION: MW-4

SITE NAME: Frank Adams School

SITE LOCATION: St. Johnsbury, Vermont

INSTALLATION DATE: 2 July 2002

JOB NUMBER: 22-040

WELL DEPTH:	15' bgs	BORING DEPTH:	15' bgs	RRA REPRESENTATIVE:	Patricia Coppolino
DEPTH TO WATER (DURING DRILLING):	8' bgs	DRILLING COMPANY:	Technical Drilling Company Sterling, Massachusetts		
SCREEN DIAMETER:	2"	DEPTH:	15' bgs to 5' bgs	SAMPLING METHOD:	Hollow Stem Auger
SCREEN TYPE/SIZE:	0.010 slot schedule 40 PVC	REFERENCE POINT (RP):	not measured		
RISER DIAMETER:	2"	DEPTH:	5' bgs to 0.6' bgs		
RISER TYPE/SIZE:	Schedule 40 PVC				

DEPTH (IN FEET)	SAMPLE DEPTH (FT)	BLOWS/6" AND RECOVERY (inches)	SAMPLE DESCRIPTION AND NOTES	PID (PPM)	WELL PROFILE	LEGEND
0						Concrete
1						Native Material
2						Bentonite
3						Filter Sand
4	4-6	2 1/5 4/5 19"	Top 19": brown medium SAND. Moist at bottom.	0.0		Riser
5						Screen
6						Water Level
7						
8						
9	9-11	3 1/2 4/3 16"	Top 16": Same as above. WET	0.0		
10						
11						
12						
13						
14						
15						
16			Bottom of Boring. Set well at 15'			
17						
18						
19						
20						
21						
22						

PROPORTIONS USED  
AND 33-50%  
SOME 20-33%  
LITTLE 10-20%  
TRACE 0-10%

BLOW COUNT (COHESIVE SOILS)  
<2 VERY SOFT  
2-4 SOFT  
4-8 MEDIUM STIFF  
8-15 STIFF  
15-30 VERY STIFF  
>30 HARD

BLOW COUNT (GRANULAR SOILS)  
0-4 VERY LOOSE  
4-10 LOOSE  
10-30 MEDIUM DENSE  
30-50 DENSE  
>50 VERY DENSE

Notes:  
PID used: Photovac 2020

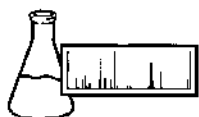
Ross Environmental Associates  
Phone: 802-253-4280

73 School Street PO Box 1533

Stowe, Vermont 05672  
Fax: 802-253-4829

**LABORATORY  
ANALYTICAL REPORTS**

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**LABORATORY REPORT**

CLIENT: Ross Environ. Assoc., Inc.

ORDER ID: 18662

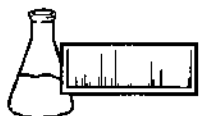
PROJECT: Frank School/22-040

DATE RECEIVED: July 11, 2002

REPORT DATE: July 23, 2002

SAMPLER: JS

Site: MW-1 Ref. Number: 196394 Anal. Method: SW 8021B Date Sampled: 7/10/02 Time Sampled: 1:10 PM Analysis Date: 7/19/02 Analyst: 420	Site: MW-3 Ref. Number: 196396 Anal. Method: SW 8021B Date Sampled: 7/10/02 Time Sampled: 1:30 PM Analysis Date: 7/19/02 Analyst: 420	Site: MW-22 Ref. Number: 196398 Anal. Method: SW 8021B Date Sampled: 7/10/02 Time Sampled: NI Analysis Date: 7/19/02 Analyst: 420																																																																		
<table><tr><th>Parameter</th><th>Results ug/L</th></tr><tr><td>MTBE</td><td>&lt; 10.0</td></tr><tr><td>Benzene</td><td>&lt; 5.0</td></tr><tr><td>Toluene</td><td>13.9</td></tr><tr><td>Ethylbenzene</td><td>&lt; 5.0</td></tr><tr><td>Xylenes, Total</td><td>46.7</td></tr><tr><td>1,3,5 Trimethyl Benzene</td><td>17.4</td></tr><tr><td>1,2,4 Trimethyl Benzene</td><td>59.6</td></tr><tr><td>Naphthalene</td><td>35.5</td></tr><tr><td>UIP's</td><td>&gt; 10</td></tr><tr><td>Surrogate 1</td><td>102.0%</td></tr></table>	Parameter	Results ug/L	MTBE	< 10.0	Benzene	< 5.0	Toluene	13.9	Ethylbenzene	< 5.0	Xylenes, Total	46.7	1,3,5 Trimethyl Benzene	17.4	1,2,4 Trimethyl Benzene	59.6	Naphthalene	35.5	UIP's	> 10	Surrogate 1	102.0%	<table><tr><th>Parameter</th><th>Results ug/L</th></tr><tr><td>MTBE</td><td>&lt; 2.0</td></tr><tr><td>Benzene</td><td>&lt; 1.0</td></tr><tr><td>Toluene</td><td>&lt; 1.0</td></tr><tr><td>Ethylbenzene</td><td>&lt; 1.0</td></tr><tr><td>Xylenes, Total</td><td>&lt; 2.0</td></tr><tr><td>1,3,5 Trimethyl Benzene</td><td>&lt; 1.0</td></tr><tr><td>1,2,4 Trimethyl Benzene</td><td>&lt; 1.0</td></tr><tr><td>Naphthalene</td><td>&lt; 1.0</td></tr><tr><td>UIP's</td><td>&gt; 10.</td></tr><tr><td>Surrogate 1</td><td>101.0%</td></tr></table>	Parameter	Results ug/L	MTBE	< 2.0	Benzene	< 1.0	Toluene	< 1.0	Ethylbenzene	< 1.0	Xylenes, Total	< 2.0	1,3,5 Trimethyl Benzene	< 1.0	1,2,4 Trimethyl Benzene	< 1.0	Naphthalene	< 1.0	UIP's	> 10.	Surrogate 1	101.0%	<table><tr><th>Parameter</th><th>Results ug/L</th></tr><tr><td>MTBE</td><td>&lt; 10.0</td></tr><tr><td>Benzene</td><td>&lt; 5.0</td></tr><tr><td>Toluene</td><td>&lt; 5.0</td></tr><tr><td>Ethylbenzene</td><td>&lt; 5.0</td></tr><tr><td>Xylenes, Total</td><td>15.3</td></tr><tr><td>1,3,5 Trimethyl Benzene</td><td>17.8</td></tr><tr><td>1,2,4 Trimethyl Benzene</td><td>52.3</td></tr><tr><td>Naphthalene</td><td>124.</td></tr><tr><td>UIP's</td><td>&gt; 10.</td></tr><tr><td>Surrogate 1</td><td>100.0%</td></tr></table>	Parameter	Results ug/L	MTBE	< 10.0	Benzene	< 5.0	Toluene	< 5.0	Ethylbenzene	< 5.0	Xylenes, Total	15.3	1,3,5 Trimethyl Benzene	17.8	1,2,4 Trimethyl Benzene	52.3	Naphthalene	124.	UIP's	> 10.	Surrogate 1	100.0%
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Site: MW-2 Ref. Number: 196395 Anal. Method: SW 8021B Date Sampled: 7/10/02 Time Sampled: 1:20 PM Analysis Date: 7/19/02 Analyst: 420	Site: MW-4 Ref. Number: 196397 Anal. Method: SW 8021B Date Sampled: 7/10/02 Time Sampled: 1:40 PM Analysis Date: 7/18/02 Analyst: 420	Site: TB-1 Ref. Number: 196399 Anal. Method: SW 8021B Date Sampled: 7/10/02 Time Sampled: 1:00 PM Analysis Date: 7/18/02 Analyst: 420																																																																		
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Surrogate 1	102.0%																																																																			

**LABORATORY REPORT**

CLIENT: Ross Environ. Assoc., Inc.

ORDER ID: 18662

PROJECT: Frank School/22-040

DATE RECEIVED: July 11, 2002

REPORT DATE: July 18, 2002

SAMPLER: JS

ANALYST: 333

Ref. Number: 196394

Site: MW-1

Date Sampled: July 10, 2002

Time: 1:10 PM

<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Method</u>	<u>Analysis Date</u>
TPH 8015 DRO	7.63	mg/L	SW 8015B	7/17/02

Ref. Number: 196395

Site: MW-2

Date Sampled: July 10, 2002

Time: 1:20 PM

<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Method</u>	<u>Analysis Date</u>
TPH 8015 DRO	9.09	mg/L	SW 8015B	7/17/02

Ref. Number: 196396

Site: MW-3

Date Sampled: July 10, 2002

Time: 1:30 PM

<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Method</u>	<u>Analysis Date</u>
TPH 8015 DRO	0.66	mg/L	SW 8015B	7/18/02

Ref. Number: 196397

Site: MW-4

Date Sampled: July 10, 2002

Time: 1:40 PM

<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Method</u>	<u>Analysis Date</u>
TPH 8015 DRO	< 0.40	mg/L	SW 8015B	7/18/02

Ref. Number: 196398

Site: MW-22

Date Sampled: July 10, 2002

Time: NI

<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Method</u>	<u>Analysis Date</u>
TPH 8015 DRO	8.54	mg/L	SW 8015B	7/18/02